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Dated 23 July 1999

The Patent Office

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By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of

BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED,
Incorporated in the United Kingdom,
Globe House,
1 Water Street,
LONDON,
WC2R 3LA,
United Kingdom

[ADP No. 07515778003]

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Cardiff Road
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1. Your reference

RD 416

2. Patent application number
(The Patent Office will fill in this part)

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

British American Tobacco (Investments) Limited
Millbank
Knowle Green
Staines
Middlesex TW18 1DY
England

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

England & Wales

SECTION 20(1977 ACT) APPLICATION FILED

000 6918 0002 25.01.99

4. Title of the invention

Smoke-Modifying Agents and Incorporation thereof in Smoking Material Rods

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Mrs. M.R.Walford / K.J.H. MacLean
Patents Department
British American Tobacco (Investments) Limited
R&D Centre
Regents Park Road
Southampton SO15 8TL
England

Patents ADP number *(if you know it)*

0741163 0001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

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b) there is an inventor who is not named as an applicant, or
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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature Margot Ruth Walford Date 13.8.98

Margot Ruth WALFORD - Assistant Secretary
~~British American Tobacco (Investments) Limited~~

12. Name and daytime telephone number of person to contact in the United Kingdom

Mrs. Aylsa Williams 01703 793727

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Smoke-Modifying Agents and Incorporation thereof in Smoking Material Rods

The present invention relates to the manufacture of fibriform material comprising smoke-modifying agents and the incorporation of fibriform material comprising smoke-modifying agents in smoking material rods.

It has heretofore been proposed to incorporate a filament comprising smoke-modifying agents in a smoking material rod, such as a tobacco rod. For example, in GB 2 070 409 it was proposed that a filament comprising smoke-modifying agents be incorporated in the smoking material rod by insertion of the filament at the tongue of the garniture of a tobacco rod making machine. As would be apparent to those skilled in the art, insertion of a filament at the tongue of the garniture would inevitably require bending of the filament, which bending may be undesirable under certain circumstances, such as when a filament of lesser flexibility is used. Furthermore, when inserting filaments at the tongue of the garniture, the precise location of the filament laterally of the resulting tobacco rod is not easily regulated and also, disadvantageously, the flow of tobacco at the garniture can be readily disturbed.

The filament disclosed in GB 2 070 409 may be formed of or obtained from a fibrous material, such as tobacco, paper, cotton or man-made textile fibres, which material readily carries or can be readily impregnated with smoke-modifying agents. A possible disadvantage of the invention the subject of GB 2 070 409 is that the smoke-modifying agents, if

volatile, as is menthol for instance, can readily migrate fr the filament, resulting in losses of the agent(s). The migration of significant amounts of the smoke-modifying agents from the region of application is highly undesirable and thus for example methods of encapsulation of flavourants have been devised to prevent such migration. Considerable work has been undertaken in respect of the encapsulation of flavourants in beads or microcapsules. However, problems may exist in maintaining such beads or micro-capsules in cigarette tobacco rods.

US 5,144,966 discloses a flavourant-release additive in the form of a filament for incorporation in the combustible filler of cigarette products and a method of production of such a filament. The filament disclosed in US 5,144,966 comprises a core matrix and a co-extensive sheath coating, wherein the core matrix comprises a mixture of flavourant compound and polysaccharide binder, and the sheath coating comprises a non-porous calcium alginate film. Such filaments are produced by a process which comprises 1) extruding an aqueous mixture of flavourant compound and polysaccharide binder through an inner nozzle to form a gelled core fibre, 2) simultaneously co-extruding an aqueous solution of water-soluble alginate salt through an outer nozzle, coaxial of the inner nozzle, to apply a co-extensive sheath coating on the core fibre, and 3) contacting the thus formed filament with an aqueous calcium compound solution to convert sodium alginate to insoluble calcium alginate in the filament sheath coating, thus to encapsulate the flavourant. This co-extrusion method for forming a type of encapsulated filament is cumbersome when

producing large quantities of filaments, which of course, would be required if such filaments were to be incorporated into cigarettes at commercial manufacturing speeds.

In US 5,144,966 in Column 3, lines 20-23 it is stated, in respect of the incorporation of filments in filler rod during formulation of the rod on a rod making machine, that the filament, on a reel module, can be fed continuously to the moving cigarette wrapper strip in co-ordination with the combustible filler feed stream. As is well known to those persons skilled in the art, in cigarette manufacture the cigarette wrapper strip is fed directly into the garniture of the tobacco rod making machine. US 5,144,966 clearly teaches that the filament is fed to the moving cigarette wrapper strip and thus that the filament is fed to the garniture of the tobacco rod making machine, much in the same manner as that disclosed in GB 2 070 409 above. The disadvantages of such a system, as outlined above, include the lateral positioning of the fibre in the completed tobacco rod being substantially unregulated and the introduction of inflexible fibres being difficult.

The present invention is predicated upon Applicant's realisation that it is important that when a smoke-modifying agent is incorporated in a tobacco rod such as to be distributed along the rod, the agent is located at an axial zone of the rod. Such axial zone location of the agent ensures maximal transfer efficiency of the agent into mainstream smoke. Furthermore, the location of the agent at an axial zone of the rod, ensures a minimal propensity of spot formation on the tobacco rod wrapper. In addition, ash

formation in cigarettes comprising a tobacco rod having smoke-modifying agent at an axial zone thereof resembles that of conventional cigarettes.

US 4,219,031 teaches a method of making a smoking article, which smoking article comprises a gas permeable, self-supporting central core consisting essentially of a carbonised cellulose rod, which core is circumscribed by tobacco. Reference is made in Column 5, line 11 to the feeding of a carbonised rod into cigarette fabricating equipment, which equipment, it is said, acts to arrange cut tobacco shreds around the periphery of the core (rod). However, there is no teaching as to how this could be achieved practically.

Finally, in US 4,727,888 a method is disclosed for making a smoking article rod, for which method two tobacco rod making machines are juxtaposed with the respective garnitures in alignment. The first making machine produces a tobacco rod the diameter of which is smaller than that of a conventional cigarette. This small diameter tobacco rod is then fed from the first making machine directly into the second making machine, in which further tobacco is fed to and around the small diameter rod and a paper wrapper is applied about the layer of further tobacco, thus to form a coaxial tobacco rod of conventional exterior circumferential dimension.

It is an object of the present invention to provide an improved and commercially practical method of incorporating fibriform smoke-modifying material in a smoking material rod.

The present invention provides a method of incorporating fibriform smoke-modifying material in smoking material rod,

wherein fibriform smoke-modifying material is fed longitudinally thereof to a rod making machine, the feed path in the machine extending in the vicinity of and being in the travel direction of the smoking material deposition run of the suction band of said machine, and the feed path extending parallel to the suction band guide rails of said machine, the fibriform smoke-modifying material being maintained, by guide means in said machine, at a predetermined distance from said run of said suction band against the suction force towards said run until a sufficient depth of filamentary smoking material has been deposited on said run to support said fibriform smoke-modifying material substantially at said distance from said run, thereafter further said smoking material being deposited on said run.

The fibriform smoke-modifying material suitably takes the form of a single, continuous, fibriform element. Alternatively, the fibriform smoke-modifying material is fed to and into contact with the filamentary smoking material in the form of a sequence of discrete fibriform elements. In the latter case each element, in the feed path of the elements, may be at each end thereof in contact with the respective ends of the next adjacent elements of the sequence thereof, or may be spaced therefrom.

In that filamentary smoking material is deposited on the deposition run of the suction band both before and after the fibriform smoke-modifying material becomes supported at, or substantially at, the said predetermined distance from the run by smoking material on the run, in the carpet of smoking material as finally formed at the downstream end of the run

the element(s) is disposed other than at the upper or lower boundary of the carpet. The position of the element(s) relatively of the upper and lower boundaries is determined in accordance with the location of the downstream end of the guide means relative to the location at which smoking material is first deposited on the deposition run of the suction band. Suitably, the location of the downstream end of the guide means is selected to be in a mid zone of that portion of the deposition run which extends from the location at which smoking material is first deposited on the deposition run to the downstream location at which the carpet of smoking material is finally formed. Thus, for example, the said location of the downstream end of the guide means may be situate between about 25% and about 60% of the length of said portion of the deposition run as taken from the location at which smoking material is first deposited on the run, and preferably between about 25% and about 40%. Suitably too, if the fibriform smoke-modifying material takes the form of a single only, continuous fibriform element, the feed path of the fibriform element in the making machine is aligned, or substantially aligned, with the plan view longitudinal centre line of the carpet on the deposition run of the suction band; that is to say, the element is, throughout the feed path thereof in the making machine, equi-distant, or substantially equi-distant, the suction band guide rails of the machine. As will be readily apparent to those of ordinary skill in the art, if two, say, continuous fibriform elements are fed to the making machine, the respective feed paths thereof are in the proximity of the said longitudinal centre line of the carpet

and, suitably, these feed paths are equi-distant said centre line. By virtue of said location of the downstream end of the guide means being in a mid zone of said portion of the deposition run, the fibriform element(s) extends within an axial zone of the finally formed smoking material carpet, and thus also the element(s) extends within an axial zone of the subsequently formed smoking material rod.

In the case in which the fibriform smoke-modifying material takes the form of a single only, continuous, fibriform element, preferably the feed path is so aligned and said location of the downstream end of the guide means is so selected, that in the smoking material rod the element extends precisley coaxially, or substantially coaxially, of the rod.

Preferably, the guide means comprises rigid, elongate body means, which body means is provided with a guidance bore. The guidance bore is configured and dimensioned so as to ensure unimpeded movement through the bore of fibriform smoke-modifying material. Suitably, the elongate body is of generally tubular conformation. Thus, for example, the elongate body may take the form of a tube, the exterior diameter of which tube is suitably within a range of about 0.5mm to about 3.0mm in a case in which the fibriform smoke-modifying material takes the form of a single fibriform element. Conveniently, the exterior diameter of the tube is about 1.5mm. Thus it may be that the elongate body generally resembles a syringe needle.

Instead of the guidance bore being dimensioned appropriately for the movement therethrough of a single fibriform element, in the case in which two or more elements

are fed simultaneously to the making machine, a single, large guidance bore may be employed for the guided movement therethrough of the two or more elements in side-by-side disposition. Alternatively, each of the two or more elements is guided in a respective bore of a plurality of guidance bores. A single or plurality of elongate body means may provide the plurality of guidance bores.

Advantageously, the exterior conformation of the single elongate body means or the plurality thereof of the guide means is such as to minimise the obstacle presented, by the presence of the body means, to the flow of filamentary smoking material to the deposition run of the suction band of the making machine. Thus, for example, a streamline fairing may be provided, which fairing extends upwardly and/or downwardly of the elongate body means. Alternatively, or in addition, the flow of smoking material to the deposition run in the region of the guide means is aided by the provision of a modified flow path configuration. Thus in the vicinity of the guide means the flow path to each side thereof is enlarged, i.e. the lateral distance between the guide means and the path boundary to each side thereof is increased.

A number of other measures may be taken with a view to ensuring that there is maintained in way of the guide means, and notwithstanding the presence thereof, the requisite flow of filamentary smoking material to, and depositing on, the deposition run of the suction band. Thus, for example, the profile of each of the guide rails is modified so to provide a modification and streamlining of the boundary of the path of flow of air and filamentary smoking material entrained therein

to the deposition run of the suction band. In accordance with another of the aforesaid measures, the degree of suction at that portion of the deposition run overlying the guide means is modified relatively to that obtaining at the remainder of the deposition run. The degree of suction exerted in way of the guide means may, for example, be maintained at an elevated level and/or may be continuously varied.

Advantageously, the fibriform smoke-modifying element(s) is conveyed continuously to the guide means by feed means. The feed means may comprise a pair of opposed feed rollers, which rollers are operable to draw a fibriform element from a wound storage source thereof and to feed the element to and through the guide means bore.

The present invention further provides a process for the manufacture of a homogenous fibriform element comprising a smoke-modifying agent, wherein a mixture comprising a solution of polysaccharide and a smoke-modifying agent is fed through a nozzle means, and a jet of said mixture issuing from said nozzle means is brought into contact with a solution containing multivalent cations thus to effect solidification of said mixture.

~~The non-solid mixture may take the form of, for example,~~ a solution, a dispersion or an emulsion.

Advantageously, the mixture is heated to provide an elevated temperature of the mixture of, for example, 45°C and is fed at an elevated temperature through the nozzle means. Suitably, whilst at an elevated temperature, the mixture is stirred continuously.

Preferably, the nozzle means is multi-nozzle means. Suitably, the mixture is forced to and through the nozzle means under the action of pressurised air, the mixture being supplied in a substantially continuous manner. The mixture is continuously stirred.

Alternatively, the fibriform elements may be prepared by a process wherein a thread of fibrous material, for example tobacco, paper, cotton or man-made textile fibres, is passed through a mixture comprising a solution of a polysaccharide and a smoke-modifying agent, the coated thread of fibrous material is then contacted with a solution containing multivalent cations thus to effect solidification of said mixture.

As an alternative or in addition to bringing the mixture comprising a solution of polysaccharide and a smoke-modifying agent into contact with a solution containing multivalent cations, the mixture can be brought into contact with an acidic solution, acetic acid for instance, thus to effect solidification of said mixture

If there is a requirement to dry the so-formed fibriform elements, various methods are available to persons skilled in the art for drying the elements, for example the elements may be passed through an annular air knife or a drying tunnel, or multiple combinations thereof.

Conveniently, the fibriform elements, in a dry, non-adhesive condition, are wound onto a spool for storage, the spool being of an appropriate diameter such that excessive bending of the element is avoided. Alternatively, the

elements can be cut into lengths, of about 30cm for example, for subsequent use.

The elements are preferably not breakable merely by being bent or drawn on. Thus, if deemed necessary, plasticisers, glycerol and/or propylene glycol for instance, can be added to the initial mixture in order to increase the flexibility and/or tensile strength of the elements.

The initial mixture may further comprise an emulsifier if such an emulsifier is considered to be a requirement. The emulsifier may be, for example, a modified polysaccharide such as modified starch.

The present invention further provides a homogenous, or substantially homogenous fibriform element comprising a matrix of polysaccharide and at least one smoke-modifying agent, wherein at least at the outer surface thereof a mesh of multivalent cations is present.

In that the fibriform element is at least substantially homogenous, the smoke-modifying agent is distributed evenly throughout the element, so that the concentration of smoke-modifying agent along the element is at least substantially constant.

The homogenous element is such that at least one smoke-modifying agent is encapsulated, in the sense of being held in the element against escape therefrom by, for example, volatilisation at ambient temperatures.

The polysaccharide is preferably in aqueous solution. The polysaccharide may suitably be an acid polysaccharide in the form of an alkali metal salt, for example an alginate, particularly sodium alginate. Other suitable polysaccharides

which may be contemplated include pectins, gellan gum, carrageenan, agar, celluloses, gum arabic, starch, xanthan gum and guar gum.

The solution containing multivalent cations may be, for example, an aqueous or alcoholic solution. The multivalent cations are ions of the group consisting of calcium, strontium, barium, iron, silver, aluminium, manganese, vanadium, copper and zinc, particularly calcium ions. For instance, a suitable aqueous solution containing mutlivalent cations is aqueous calcium chloride.

The present invention further provides a homogenous fibriform element as manufactured by a process in accordance with the process statement of invention hereinabove.

Much by preference, the homogenous element is of a constant cross-section. Suitably, the element is of circular cross-section, in which case the diameter thereof will generally not be more than about 3.0mm, preferably not exceeding about 1.0mm.

The present invention further provides a smoking article comprising a smoking material rod, within which rod there extends, generally longitudinally of the rod, a fibriform element, which element comprises a matrix, which matrix comprises polysaccharide, and at least one smoke-modifying agent, the element also comprising, at least at the outer surface thereof, a mesh of multivalent cations.

Preferably the fibriform element extends co-extensively of the smoking material rod. More than one fibriform element may extend, within the smoking rod, generally longitudinally thereof, in which case, each of the elements extends within an

axial zone of the rod. Advantageously, if a single only element extends within the smoking material rod, the element extends at least substantially coaxially of the rod. An advantage existing as a consequence of the element(s) extending with in an axial zone of the smoking material rod is that when a smoking article comprising the smoking material rod is smoked, losses of smoke-modifying agent to sidestream smoke are minimised and thus the transfer efficiency of the smoke-modifying agent to the mainstream smoke is improved.

The present invention further provides a smoking article comprising a smoking material rod including at least one homogenous fibriform element as manufactured by a process in accordance with the process statement of invention hereinabove.

Suitable smoke-modifying agents may comprise, for example, tobacco dust or flavourant(s), menthol and/or furaneol, for example. In the former case the tobacco dust may be impregnated with a flavourant.

In order that the present invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:-

Figure 1 shows an upstream section of a tobacco rod making machine and associated equipment;

Figure 2 shows a transverse section, to an enhanced scale, taken at the guide rails and at section II-II of Figure 1 looking in the direction of the arrows;

Figure 3 corresponding to Figure 2, but depicts a somewhat different arrangement of parts;

Figure 4 shows apparatus for the continuous manufacture of a fibriform element;

Figure 5 shows apparatus for the continuous manufacture of a plurality of fibriform elements; and

Figure 6 shows a smoking article incorporating a fibriform element.

In Figure 1, reference number 1 designates generally a tobacco rod making machine, only an upstream portion of which is shown. The making machine 1 comprises the well known features of an upwardly extending tobacco-feed chimney 2, a foraminous metallic suction band 3 trained about rollers 4 and 5 (one of which is a drive roller), a trough guide 6 and ecreteurs 7 and 8.

In operation of the making machine 1, filamentary cut tobacco filler is fed continuously to the lower end of the chimney 2 by conventional feed means (not shown) of the machine 1 and flows upwardly within the chimney 2 (as indicated by arrow T) in an air flow which is maintained under the action of a vacuum which is maintained above lower run 3' of the foraminous suction band 3 (see Figures 1, 2 and 3). At the trough guide 6 the filler is deposited on the underside of the lower run 3' of the suction band 3 and is transported, as a carpet, on the band 3, forwards (leftwards viewing Figure 1, i.e. in the direction of arrow A) to the location of the ecreteurs 7 and 8, which serve to trim filler from the carpet. As is well known to those skilled in the art, downstream of the ecreteurs 7 and 8 the tobacco carpet is fed into a garniture (not shown) of the making machine 1 under the action of a transporting garniture band (also not shown) which acts,

in addition, to feed a continuous web of cigarette paper to the garniture. The garniture serves to enwrap the tobacco in the cigarette paper web to provide a continuous tobacco rod. Signals from a rod density monitoring means (also not shown) downstream of the garniture cause position changes of the ecreteurs 7 and 8 such that the amount of tobacco trimmed from the carpet on the suction band 3 is that requisite to maintain the density of the cigarette rod within specified tolerance limits.

As is indicated by Figures 2 and 3, the trough guide 6 comprises first and second suction band guide rails 9 and 10. Extending between the guide rails 9 and 10 is guide means 11 taking the form of a straight rigid guide tube of 1.0mm exterior diameter, formed, for example, of a stainless steel. Figure 2 shows a transverse section taken at the guide rails and at section II-II of Figure 1 looking in the direction of the arrows and depicts guide rails 9 and 10 which have been altered in shape in the region of the guide tube 11 to ensure an adequate flow of air and filamentary tobacco entrained therein to the suction band 3 regardless of the presence of the guide tube 11. The cross-sectional configurations of the section taken along line III-III of Figure 1 looking in the direction of the arrows, are as per those shown for the rails 9, 10 in Figure 3. Figure 3 further depicts a streamline fairing 12 extending vertically downwardly from the guide tube 11 so that the flow of air and filamentary tobacco to the suction band 3 is smoothly diverted around the guide tube 11. These mechanisms prevent the presence of the guide tube 11 resulting in blockages caused by a build-up of filamentary

tobacco in the vicinity of the tube 11. The presence of fairing 12 may further increase the inherent rigidity of guide tube 11.

In Figure 1 reference numeral 13 designates generally feed means, which feed means 13 comprises a pair of opposed feed rollers 14a and 14b which run at the same speed as that of the suction band 3. The rollers 14a and 14b serve to draw a continuous fibriform element 15 from a spool 16 upon which the continuous element 15 is wound. The continous element 15 is fed to and through the guide tube 11 as indicated in Figure 1.

In operation of the making machine 1 and the associated feed means 13, filamentary cut tobacco filler, entrained in conveying air, passes up the chimney 2 and is deposited on the moving lower run 3' of the suction band 3 and, simultaneously therewith, the filamentary element 15 is continously fed forwardly by the feed means 13 and in its travel in a feed path between the guide rails 9, 10 the element is guided by the guide tube 11. In the travel thereof up the chimney 2 in way of the guide tube 11, the filamentary tobacco flows adequately to the run 3' of the suction band 3 by virtue of the provision of flow modifying means, as for example, those as described above with reference to Figure 1 and/or Figure 3.

As is well known to those skilled in the art, the depth of the carpet of filamentary tobacco which is deposited on run 3' of the suction band 3 increases proportionately from the right to the left hand of the chimney 2 (as viewing Figure 1). The length dimension of that portion of the guide tube 11 which extends within the chimney 2 is such that the depth of

the aforesaid tobacco carpet at the location of the outlet end (the leftward end as viewing Figure 1) of the tube 11 is substantially equivalent to the distance by which the tube 11, at its outlet end, is spaced from the run 3' of the suction band 3. This being the case, immediately upon the emergence thereof from the guide tube 11, the fibriform element 15 is supported by the tobacco carpet against the suction force acting towards the run 3' of the suction band 3. By virtue of the element 15 being so supported upon emergence from the guide tube 11, it is possible to ensure that in the subsequently formed tobacco rod the element 15 is disposed co-axially of the rod.

Figures 4 and 5 depict generally first and second apparatus for the continuous manufacture respectively of a single fibriform element 15 and a plurality of fibriform elements 15. In use of these apparatus a continuously heated and stirred emulsion 18 of aqueous sodium alginate solution and, menthol and propylene glycol solution (80% menthol: 20% propylene glycol), wherein the ratio of menthol : alginate in the resulting emulsions is 1:1, is transferred via a delivery tube 19 to either a single nozzle head 20 (as depicted in Figure 4) or to a multiple nozzle head 21 (as depicted in Figure 5). Pressurised air is used for this transfer, the pressurised air being supplied from an air source 22 via an air line 23. A pressure gauge 24 is positioned in the air line 23. The aqueous emulsion 18 is heated to about 45°C. As shown in Figure 4, the fibriform element 15 produced at the nozzle head 20 is then directed to and downwardly through a vertical cylinder 26. A spray means 28 sprays an aqueous

solution of calcium chloride 27 (4-6% by weight) onto the filament 15 during the passage thereof through the cylinder 26. The calcium chloride solution 27 is supplied from a reservoir thereof via a delivery tube 30 using pressurised air supplied from an air source 31 via an air line 32. A pressure gauge 33 is present in the air line 32. Excess calcium chloride solution droplets are removed via exhaust outlet 34. The excess calcium chloride solution droplets are removed by use of a suction force, which suction force can be provided by fan means. Alternatively, as shown in Figure 5, multiple elements 15 are drawn down from the nozzle head 21 onto a rotating drum 35, the speed of rotation of the drum 35 being linked to the flow rate of emulsion 18 to the nozzle head 21.

Calcium chloride solution 27 (4-6% by weight) is sprayed by spray means 28 onto the elements 15 on the rotating drum 35. The calcium chloride is supplied from a reservoir 29 thereof via a delivery tube 30, using pressurised air supplied from an air source 31 via an air line 32. A pressure gauge 33 is present in the air line 32. Excess calcium chloride solution droplets on the drum are collected in a tray (not shown) positioned beneath the drum, and suction means can be employed to remove excess calcium chloride solution droplets which are air borne.

The process, as depicted in Figures 4 and 5, subsequent to the application of the calcium chloride 27, is substantially identical for either a single fibriform element or a plurality of fibriform elements. That is to say, the element(s) is dried using an air knife 36, 37 and/or a drying tunnel 38. Both the air knife 36, 37 and the drying tunnel 38

are arranged such that in operation heated air is passed about the fibriform element(s) 15. The resulting dried element(s) is wound onto a spool(s) 16. When, as in Figure 5, a plurality of elements 15 is manufactured, each is wound singularly on the spool 16. As a person skilled in the art would be aware, the direction of travel of the fibriform element(s) 15 during the manufacture thereof may be altered at any point in the process in order to relieve the fibriform element(s) 15 of excessive gravitational tensile forces and thus prevent breakage of the element(s) 15.

The process, as depicted in Figure 5, allows for a plurality of fibriform elements 15 to be manufactured using minimal machinery.

In Figure 6, reference numeral 39 designates generally a cigarette comprising a rod of tobacco 40 and a cigarette filter 41. The cigarettes 39 further comprises a fibriform element 15 extending longitudinally and substantially co-axially of the tobacco rod 40. The fibriform element 15 comprises menthol encapsulated in an alginate matrix.

An advantage of using a fibriform element(s) comprising encapsulated menthol is that thereby an even distribution of menthol along the tobacco rod is readily attained; whereas the even distribution of capsules of encapsulated menthol along the rod can be difficult to achieve.

Figure 1

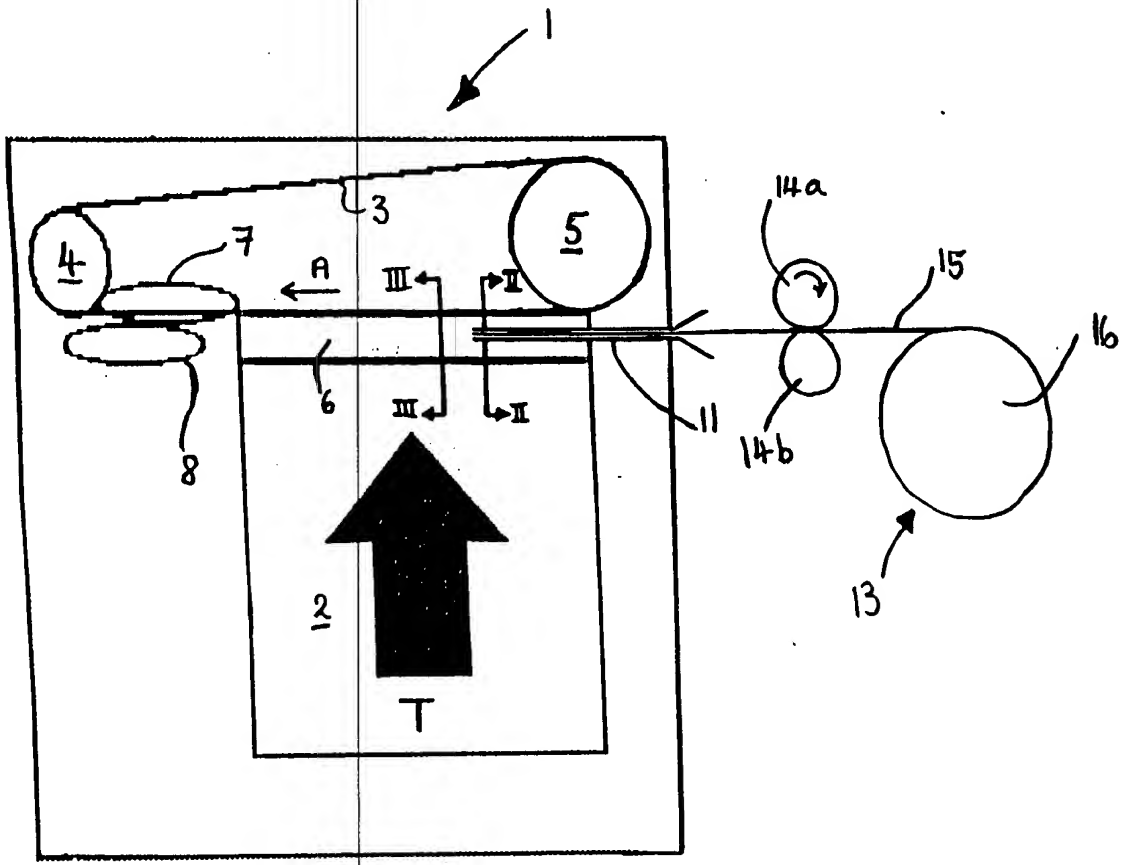


Figure 2

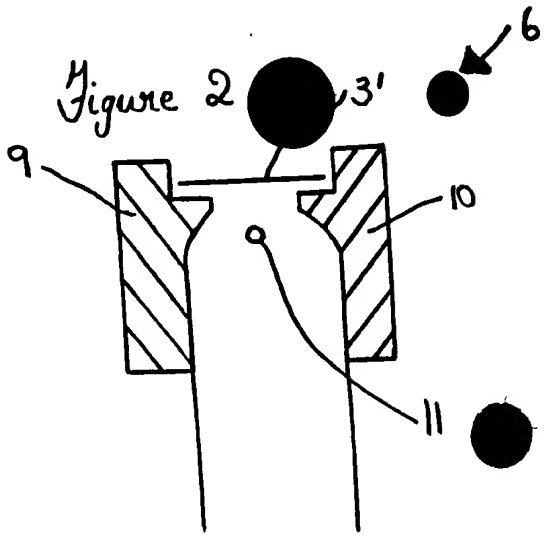
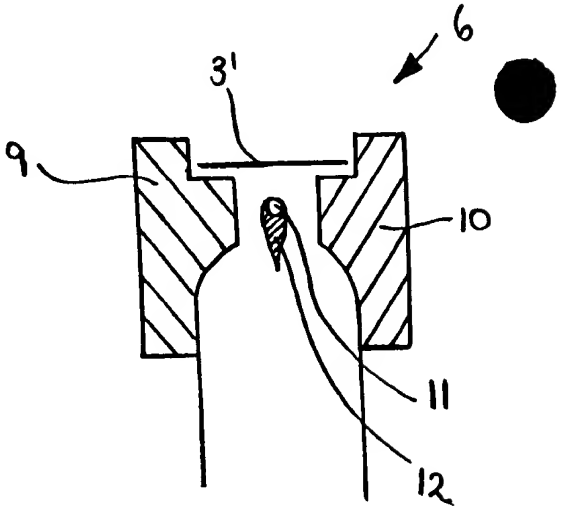


Figure 3



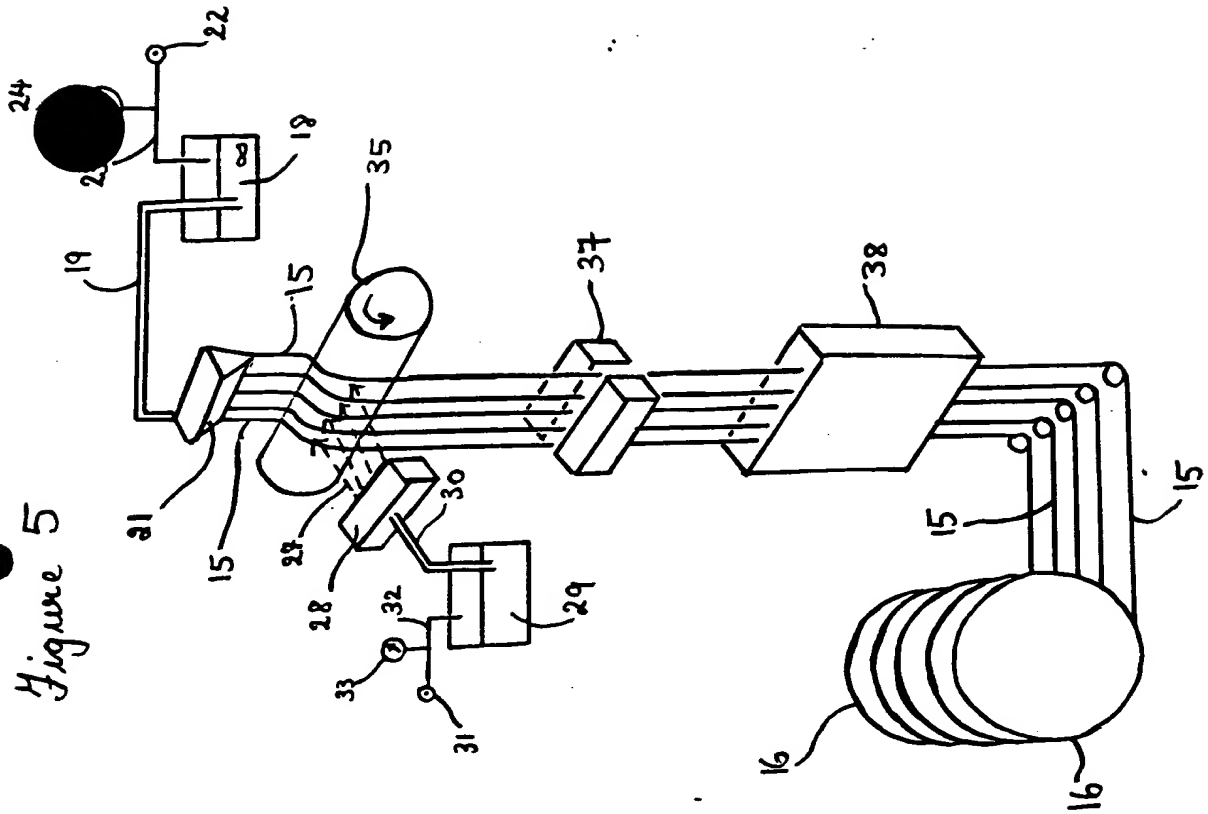


Figure 5

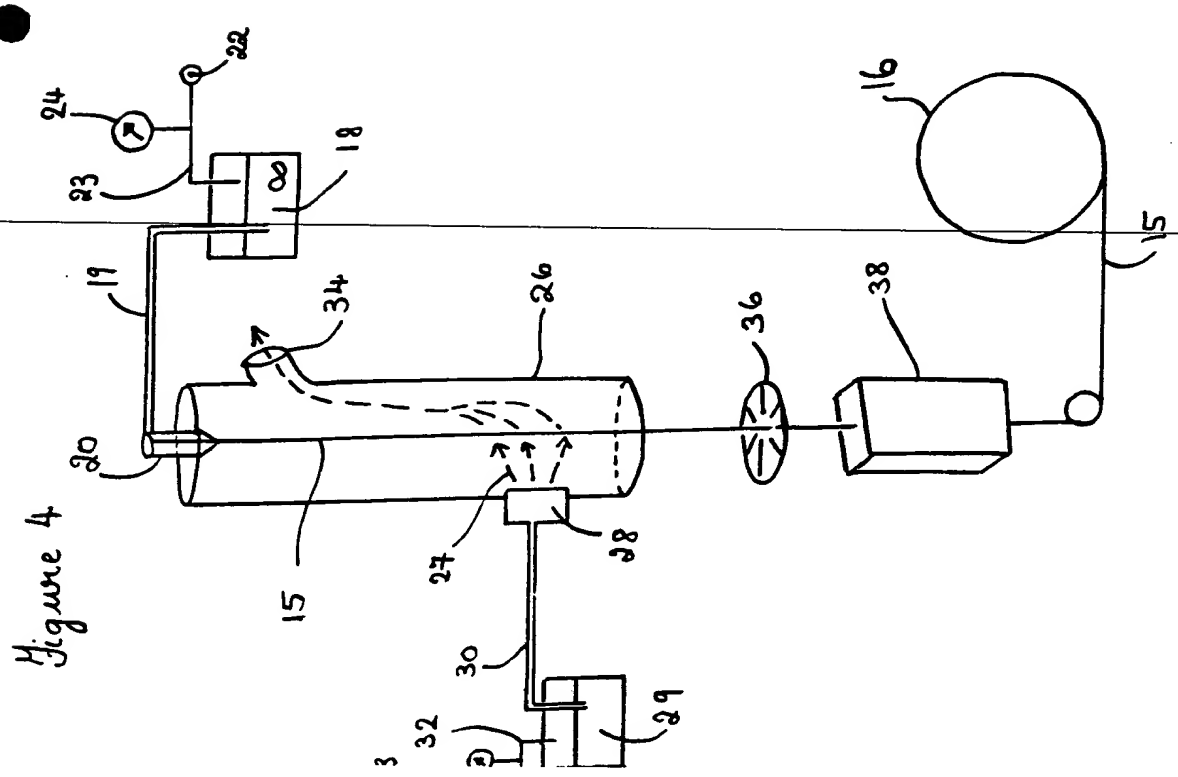


Figure 4

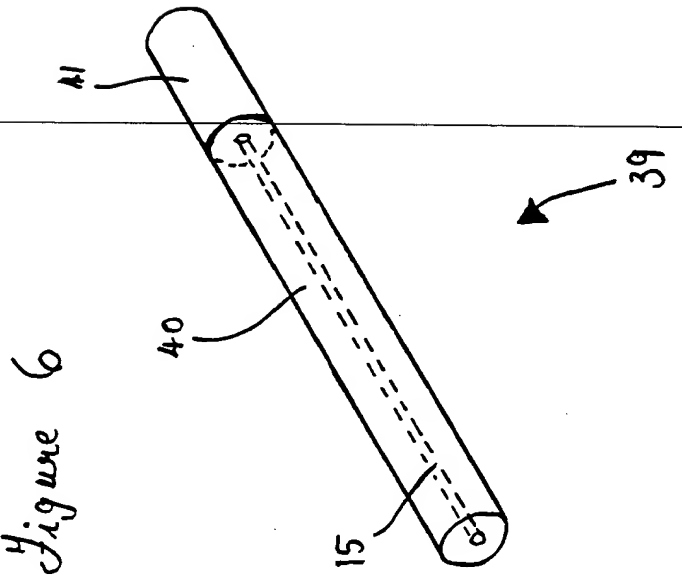


Figure 6